# Evolution of a Quasi-Linear Convective System Sampled by Phased-Array Radar

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On 2 April 2010, a quasi-linear convective system (QLCS) formed in southwestern Oklahoma and northern Texas and moved eastward through central Oklahoma during the early morning hours. Storm formation was initially limited to the Oklahoma panhandle and southern Kansas, where an advancing cold front merged with a retreating dry line in an uncapped environment. An upper-level trough approached from the west overnight, supporting large-scale ascent and a strengthening southwesterly low-level jet. Soundings in central and northern Oklahoma on the evening prior to the event indicated a strongly capped environment with a deep elevated mixed layer. The arrival of the upper-level trough during the early morning hours of 2 April 2010 provided the ascent necessary to overcome convective inhibition and promote storm formation.

Marginally severe hail was reported with the earlier storms in southern Kansas, but the most severe damage resulted from the QLCS in southwestern Oklahoma. After the QLCS formed in southwestern Oklahoma, it moved eastward into a corridor of moderately high instability, with mixed-layer CAPE values exceeding 1000 J kg-1. Strong unidirectional low-level wind shear was supportive of organized bow echo structures and low-level mesovortices. Wind damage in Rush Springs, Oklahoma approached EF1-scale intensity and was likely associated with one of the mesovortices that formed along the leading edge of the QLCS.

The evolution of the QLCS was captured by the National Weather Radar Testbed Phased Array Radar (NWRT PAR) in Norman, Oklahoma. The NWRT PAR is an S-band radar with an electronically steered beam, allowing for rapid volumetric updates (~1 min) and user-defined scanning strategies. The rapid temporal updates and dense vertical sampling of the PAR created a detailed depiction of the evolution and damaging wind mechanisms associated with the QLCS. Features in the PAR data include microbursts, multicellular storm evolution, an intensifying rear-inflow jet, and a bowing segment and rotation associated with the Rush Springs damage. PAR data are analyzed and compared to data from the nearby S-band WSR-88D radar in Twin Lakes, Oklahoma and C-band Terminal Doppler Weather Radar in Oklahoma City, Oklahoma.